

## Claims

1. An aqueous coating composition, comprising a multi-stage polymer dispersion comprising
- 5 (a) an inner phase comprising at least one latex polymer derived from at least one monomer and at least one polymerizable alkoxyated surfactant having the structure:



- 10 wherein  $R^1$  is an allyl group selected from the group consisting of  $CH_3-CH=CH-$  and  $CH_2=CH-CH_2-$ , or an acrylic group and  $R^2$  is a radical comprising at least two carbon atoms and at least one oxyethylene or oxypropylene unit;
- (b) an outer phase having a glass transition temperature of from 30°C to 110°C containing at least one ethylenic unsaturated monomer
- 15 (c) at least one pigment;
- (d) water; and
- (e) less than 3.0% by weight based on the total weight of the aqueous coating composition of anti-freeze agents.

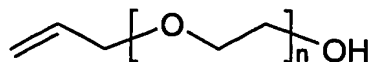
- 20 2. The composition according to claim 1, comprising less than 1.0% by weight based on the total weight of the aqueous coating composition of anti-freeze agents.

- 25 3. The composition according to claim 1, being substantially free of anti-freeze agents.

4. The composition according to any of claim 1 to claim 3, wherein  $R^2$  is  $-C_6H_3(R^3)-(O-CH_2-CH_2)_n-R^4$ ,  $-O-CH_2-CH(CH_2-O-C_6H_4-R^3)-(O-CH_2-CH_2)_n-R^4$ ,  $-(O-CH_2-CH_2)_n-R^4$ ,  $-(O-CH_2-CH(CH_3))_n-R^4$ ,  $-(O-CH_2-CH_2)_m-(O-CH_2-CH(CH_3))_n-R^4$  or  $-(O-CH_2-CH(CH_3))_m-(O-CH_2-CH_2)_n-R^4$ ;  $R^3$  is an alkyl group;  $R^4$  is hydroxy or a polar group such as sulfonate ( $-SO_3M$ ), sulfate ( $-SO_4M$ ), phosphonate ( $-PO_3M$ ) or phosphate ( $-PO_4M$ );  $M$  is  $H^+$ ,  $Na^+$ ,  $NH_4^+$ ,  $K^+$  or  $Li^+$  with the provision that  $R^4$  cannot be ( $-SO_4M$ ) or ( $-PO_4M$ ) if  $R^2$  is  $(O-CH_2-CH(CH_3))_n-R^4$  or  $-(O-CH_2-CH(CH_3))_m-(O-CH_2-CH_2)_n-R^4$ ; preferably  $R^4$  is hydroxy or ( $-PO_4M$ ),  $n$  is from about 5 to about 100; and  $m$  is from 0 to about 100.
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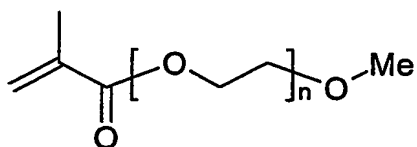
5. The composition according to claim 4, wherein  $n$  is from about 5 to about 40.

- 40 6. The composition according to any of claim 1 to claim 5, wherein the alkoxyated surfactant in the inner soft phase is a monomer expressed by the formula



with  $n = 6-12$ .

- 5 7. The composition according to any of claim 1 to claim 5, wherein the alkoxylated surfactant in the inner soft phase is a monomer expressed by the formula



with  $n = 5-10$ .

- 10 8. The composition according to any of claims 1 to 7, comprising 0 to 30 % of a solvent.
- 15 9. The composition according to any of claims 1 to 8, wherein the at least one pigment includes at least one pigment selected from the group consisting of  $\text{TiO}_2$ , clay,  $\text{CaCO}_3$ , aluminum oxide, silicon dioxide, magnesium oxide, talc (magnesium silicate), barytes (barium sulfate), zinc oxide, zinc sulfite, sodium oxide, potassium oxide and mixtures thereof.
- 20 10. The composition according to any of claims 1 to 9, wherein the at least one pigment includes  $\text{TiO}_2$ , calcium carbonate or clay.
- 25 11. The composition according to any of claims 1 to 10, wherein the inorganic pigment includes  $\text{TiO}_2$ .
- 30 12. The composition according to any of claims 1 to 11, wherein the latex polymer is selected from the group consisting of pure acrylics, styrene acrylics, vinyl acrylics and acrylated ethylene vinyl acetate copolymers.
- 35 13. The composition according to any of claims 1 to 14, wherein the latex polymer includes a pure acrylic.
14. The composition according to any of claims 1 to 13, wherein the latex polymer is derived from at least one acrylic monomer selected from the group consisting of acrylic acid, acrylic acid esters, methacrylic acid, and methacrylic acid esters.
15. The composition according to any of claims 1 to 14, wherein the latex polymer is further derived from one or more monomers selected from the group consisting of

styrene,  $\alpha$ -methyl styrene, vinyl chloride, acrylonitrile, methacrylonitrile, ureido methacrylate, vinyl acetate, vinyl esters of branched tertiary monocarboxylic acids, itaconic acid, crotonic acid, maleic acid, fumaric acid, acetyl acetoxyl ethyl methacrylate, ethylene, and C<sub>4</sub>-C<sub>8</sub> conjugated dienes.

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16. The composition according to any of claims 1 to 15, further comprising one or more additives selected from the group consisting of dispersants, surfactants, rheology modifiers, defoamers, thickeners, biocides, mildewcides, colorants, waxes, perfumes and co-solvents.

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- 17 A latex paint composition comprising a multi-stage polymer dispersion comprising
- (a) an inner phase comprising at least one latex polymer derived from at least one monomer and at least one polymerizable alkoxylated surfactant having the structure:

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wherein R<sup>1</sup> is an allyl group selected from the group consisting of CH<sub>3</sub>-CH=CH- and CH<sub>2</sub>=CH-CH<sub>2</sub>-, or an acrylic group and R<sup>2</sup> is a radical comprising at least two carbon atoms and at least one oxyethylene or oxypropylene unit;

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- (b) an outer phase having a glass transition temperature of from 30°C to 110°C containing at least one ethylenic unsaturated monomer
- (c) at least one pigment;
- (d) water; and
- (e) less than 3.0% by weight based on the total weight of the aqueous coating composition of anti-freeze agents.

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